



Young Children are Reality-Prone When Thinking about Stories

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Abstract

Many parents and some researchers assume that young children are fantastical thinkers. We examined this assumption in the domain of reasoning about fictional stories. We presented 4-year-olds with realistic and fantastical stories and asked them how best to continue these stories: with ordinary events or with events that violate real-world causal laws. Children preferred the ordinary events for both types of stories (Experiment 1, $n=42$) while a comparison group of adults ($n=68$) continued stories based on their content. To ensure that children's responses reflected their intuitions about stories *per se*, Experiment 2 ($n=60$) asked 4-year-olds to make the same choice between realistic and fantastical events, but in the context of figuring out an experimenter's preferences or learning a new word. Here, children did not demonstrate an overall bias for the realistic events. These findings suggest that children are reality-prone in the context of fictional stories.

Keywords

Fiction, possible worlds, imagination, cognitive development

Introduction

When describing young children's imaginative activities, Dorothy and Jerome Singer (1990) called the preschool years the "high season of imaginative play" and suggested that children around the age of four are particularly invested in fantasy play and stories. Recent evidence supports this view of young children as fantasy-prone. They create a variety of highly fantasy-oriented imaginary companions (Taylor, 1999), believe magic to be a real causal force (Johnson and

Harris, 1994; Phelps and Woolley, 1994; Rosengren and Hickling, 2000), and generally indulge in various forms of fantastical thinking (e.g., Harris et al., 1991; Subbotsky, 1992; see Bouchier and Davis, 2002, for a review). Children also infer the presence of new fantastical entities or magic based on little evidence (e.g., Rosengren et al., 1994; Subbotsky, 2004; Woolley et al., 2004).

The present investigation explores whether this tendency towards fantastical thinking is apparent in the context of fictional stories. We presented 4-year-olds with two different types of stories, one of which contained many fantastical elements (the Fantastical story) and one of which contained no fantastical elements (the Realistic story). We then asked children whether these stories should additionally include novel realistic events, which obey the laws of reality, or novel fantastical events, which break some law of reality. This task requires children to integrate novel events into the structure of an existing fictional world. Our goal in these studies is to explore how children understand the internal constraints placed on different kinds of stories and their preferences for how stories should be completed. As will be reviewed below, there is ample evidence that children appreciate the fantasy/reality distinction. But what happens when children are presented with a fictional environment and are asked to make inferences about it?

One possibility is that the children in our task will be drawn to the fantastical events. Singer and Singer (1990), for example, suggested that young children are attracted to unrealistic imaginative pursuits and prefer to engage in pretend games and to hear stories that involve fantastical elements. If this is the case, then the children in our studies might choose to continue both the Realistic and Fantastical stories with fantastical events. Fantastic events may be particularly attractive to children because they depict something impossible, making them more novel and interesting than realistic events.

The trouble with this first possibility is that many studies have shown that young children have a well-developed conception of the limits of fantasy. Young children distinguish between fantasy and reality, correctly claiming that the characters and events depicted in fictional stories are not real (e.g., Morrison and Gardner, 1978; Samuels and Taylor, 1994; Golomb and Galasso, 1995) and that characters inhabit different fictional worlds (Skolnick and Bloom, 2006). In addition, children recognise that fictional characters and objects have different properties than real people and objects (Boerger, 2011; Sharon and Woolley, 2004). These results imply that, while young children may enjoy various aspects of fantasy, they bear no confusion about the ontological status of fantastical events (see Weisberg, 2013, for review).

Consistent with this account, research on preschoolers' understanding of fictional stories has shown that they understand something about the kinds of

realistic and fantastical events that we use in the current studies. For example, 4-year-olds judge that fantastical events in storybooks cannot happen in reality, while realistic events can (Shtulman and Carey, 2007; Woolley and Cox, 2007). Young children also distinguish realistic from fantastical story events on more implicit tests, selectively transferring analogical solutions to real-world problems only from realistic stories, not from fantastical ones (Richert et al., 2009; Richert and Smith, 2011). These judgments stem, at least in part, from children's understanding of the structure of reality and of the types of events that are and are not really possible (Cook and Sobel, 2011; Shtulman and Carey, 2007).

If children have this kind of mature understanding of stories, then our task, which asks children to extend a fictional world, might be conceptualised as a categorization task. Realistic stories – those that do not violate any real-world causal laws – should not license novel events that do have such violations. In contrast, stories that do contain such violations could potentially license others. Intuitively, if the *Enterprise* on *Star Trek* had a tractor beam (a violation of real-world causal structure that is rarely used on the show), this should not come as a surprise to a viewer familiar to the narrative so far. In contrast, if the *Pacific Princess* (the cruise ship on *The Love Boat*) had a tractor beam, viewers would be surprised, given the way this show has been presented so far. Based on this argument and on previous research showing that adults understand the internal constraints that different stories create (Weisberg and Goodstein, 2009), we hypothesise that adults will match the ontological structure of events with the ontological structure of the narratives in which they can appear. Given their sophisticated understanding of other aspects of fictional stories and characters, young children may as well.

However, there is a third possible pattern of performance which children may demonstrate. They may extend fictional worlds with only realistic events, regardless of the prior content of that world. Weisberg and Sobel (2012) demonstrated this kind of behavior in one situation, finding that 4-year-olds would extend stories that contained only ordinary events with novel ordinary events, not with novel impossible events. Critically, here, we hypothesise that children will make the same kind of inference when most of the events in the story so far are impossible.

Why might children display such a bias? One possible reason, articulated by Bretherton (1984), is that young children's imaginative activities are script-based and hence somewhat limited. On her view, reality "slipped in" to children's pretend play because children relied on their knowledge of event structure (i.e., what happens when we *X*, where *X* is the pretend act; see also Schank and Abelson, 1977; Nelson and Seidman, 1984). Bretherton further made

a distinction “between the enactment of fairly realist scripts in which the agents and objects are not what they purport to be (low-level “what-if” play) and fantasy scripts (high-level “what-if” play)” (p. 36), and argued that young children’s play is typically only based on their lower-level understanding. These arguments were meant to apply to children’s pretend play behaviour, particularly to how children understand play scenarios that involve another person. But fictional stories are similar to these kinds of pretend games, because they are also an imaginative endeavour that involves input from another person – in this case, an author, rather than a play partner. Because of these similarities, we extend Bretherton’s analysis to predict that young children should prefer to include realistic events in stories, because their understanding of stories is also likely to be based on realistic scripts.

Further support for this hypothesis comes from Harris (2000), who relies on Scribner’s (1977) distinction between empirical and analytical orientations in reasoning. An empirical orientation involves reasoning based on experience, while an analytic orientation involves focusing on the premise of the problem and generating suppositions based on those premises, even if they are distinct from everyday experience. Harris points out that, when 4-year-olds were explicitly told that they were reasoning about a fantastic fictional world, they were more likely to take an analytic orientation (Dias and Harris, 1988). However, if children are not explicitly given this information and have to construct it themselves, they might be more biased towards an empirical-based response, which would require them to focus only on what is possible and in the realm of their everyday experiences. Based on these arguments, we predict that the children in our experiments will be reality-prone. However, we emphasise that this tendency to include realistic events within the context of a fictional story is exclusive to how children think about fictional stories, not the result a general inability to categorise events that violate real-world causal structure as similar (and similarly impossible).

To test these hypotheses, we presented participants with either realistic or fantastical fictional stories and asked them to extend these stories with novel realistic or novel fantastical events. In Experiment 1, we examined a group of 4-year-olds and adults, with the expectation that adults would choose story continuations based on the content of the story and that 4-year-olds would choose realistic events in both conditions. In Experiment 2, we contrasted 4-year-olds’ inferences about sets of fantastical events when they were and were not part of a story context. Critically, we hypothesise that 4-year-olds in this study will not have trouble categorizing fantastical events together as such, and that the reality-prone bias exists only in their construction of fictional stories.

Experiment 1

Four-year-olds and adults were read stories that either contained many violations of real-world events (e.g., dogs that could talk, children that could fly) or no violations. We examined how they would choose to continue these stories: with additional fantastical events or additional realistic events. For the children, we also examined how they responded to the same events in the absence of a story context, as a control.

Methods

Participants. Forty-two 4-year-olds (22 girls, 20 boys, $M=56.33$ months, $SD=5.30$ months, range=44 to 64 months) participated in the study. They were recruited from and tested at local preschools. There were 14 children in each of three conditions: Realistic, Fantastical, and Control, with approximately equal numbers of girls and boys in each condition.

Sixty-eight adults (30 female, 36 male, 2 unreported; $M=20.65$ years, $SD=1.17$ years) participated in an online version of the child study. They were recruited via email and received no compensation for their participation. There were 33 adults in the Realistic condition and 35 in the Fantastical condition.

Materials. We wrote and illustrated two stories that differed in their similarity to reality. Both had the same basic framework: a boy and his dog got ice cream, went to a petting zoo, and came home for dinner. In the Realistic story, there were no explicit violations of reality; the story could easily have taken place in real life. In the Fantastical story, there were many such violations; the main character could fly and turn invisible, and the animals in the story could talk (see the Appendix for the full stimulus set). The events depicted in the violation pictures had been judged to be impossible by 4-year-olds in previous studies (e.g., Schult and Wellman, 1997; Sobel, 2004).

For the children, there were three between-subjects conditions: Realistic, Fantastical, and Control. The first two conditions used the stories just described. Each story was nine pages long. The children saw a picture on each of the first eight pages that depicted the events described on that page. Children in the Control condition did not hear either story; they only saw the choice pictures described below.

In the Realistic and Fantastical conditions, there were eight points in the story in which participants were asked to choose which of two events should come next. These events were illustrated with pictures. Each pair of choice pictures was matched for length and similar in content, but one always described

an event that violated reality (fantastical picture), while the other always described an ordinary, non-violation event (realistic picture).

Procedure

Child participants were brought into a quiet room and were told that the experimenter needed help. In the Realistic and Fantastical conditions, children were told that pages from the experimenter's storybook had fallen out and had become mixed with pages from other stories. Children were asked if they could help the experimenter to decide which pages belonged in that particular storybook.

The children were then read the first page of the story. After the first page, the experimenter reached for the next page and then exclaimed, "Oh no! The next page of my story has fallen out. I have two pages that might come from my story. Can you help me figure out which page belongs in my story?" Children were read the description of both pictures in the choice pair, and then the experimenter held out both pictures to the child, asking "Which page do you think belongs in my story?" If hesitant, children were reminded of the key points in each picture. After the child picked one of the pictures, the experimenter provided neutral feedback and read the next page of the story. The order in which each set of choice pictures was presented to the child (fantastical picture first or realistic picture first) was randomised.

Children in the Control condition saw only the eight pairs of choice pictures, presented in the same order as in the story, but without hearing the text of the story. These children were told that they would see two pictures at a time and they should pick the one that they liked more. As in the two story conditions, the experimenter presented the children with the two pictures in each choice pair in a randomised order and read the description of these pictures. Then the experimenter asked the child to pick the one that s/he liked more. Following each choice, the experimenter provided neutral feedback and then presented the next pair of choice pictures.

The procedure for the adults was identical, except that they read the stories in an online survey.

Results

Our primary hypotheses concerned whether children and adults would choose the realistic or fantastical pictures when asked to continue the story. If participants are fantasy-prone, then they should choose the fantastic pictures across the board, regardless of which story they heard and regardless of whether these pictures were presented in a story context. If participants have a more

well-differentiated understanding of the constraints presented by a given fictional world, then they should choose fantastical pages only when they heard the Fantastical story and realistic pages only when they heard the Realistic story. We predict that the adults will conform to this pattern of behaviour. If participants are reality-prone, as we expect the children will be, then they should choose the realistic pictures as continuations for both stories.

We found that responses to the eight questions were reasonably similar to each other for both the adults (Cronbach's $\alpha=0.93$) and the children (Cronbach's $\alpha=0.48$). For our analyses, we thus counted the total number of realistic pages chosen by each participant and divided this number by the total number of questions (8) to obtain the proportion of each participant's realistic choices. We then averaged these proportions together by condition. Adults' average realistic responses are shown in Figure 1 and children's in Figure 2. Preliminary analyses revealed no significant effects of gender, age, school attended (for the children), or experimenter (for the children), so these variables were excluded from further analysis.

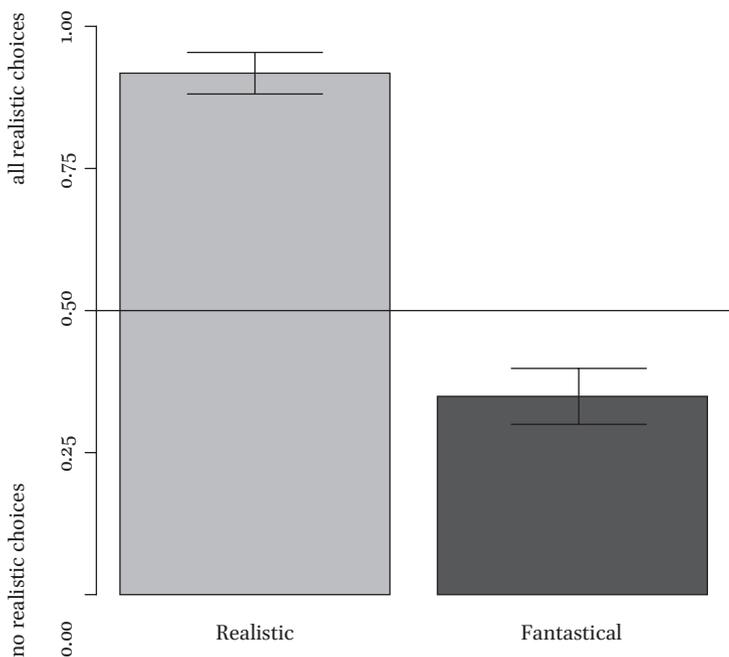


Figure 1. Average proportion of adults' choices of the realistic pictures, Experiment 1.

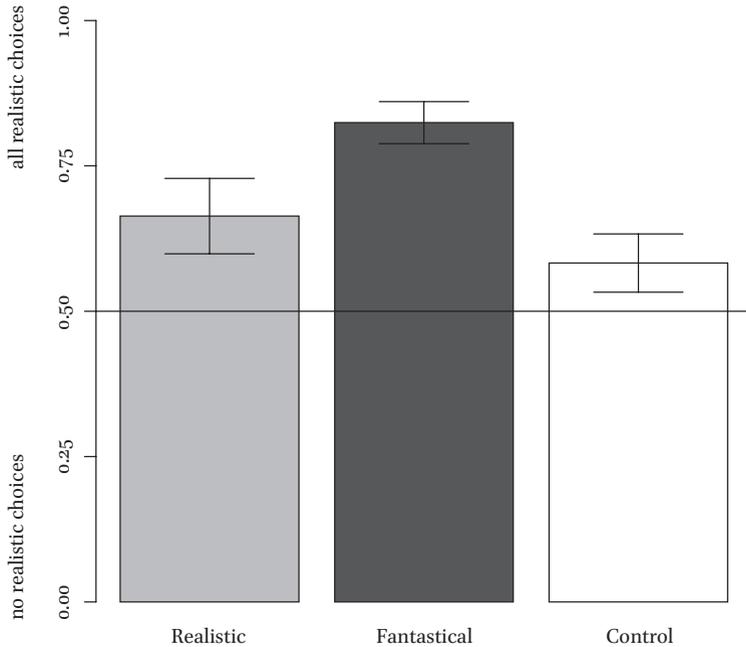


Figure 2. Average proportion of 4-year-olds' choices of the realistic pictures, Experiment 1.

Adults. In the Realistic story condition, adults chose the realistic picture 92% of the time, significantly more often than chance, $t(32)=11.40$, $p<0.01$. In the Fantastical story condition, adults chose the realistic picture only 35% of the time, significantly less often than chance, $t(34)=-3.07$, $p<0.01$. Adults were significantly more likely to choose realistic pages in the Realistic story than in the Fantastical story, $t(66)=9.18$, $p<0.01$, Cohen's $d=2.26$. These data support the hypothesis that adults used the content of the story as the basis of their choices of which novel events to include.

Children. In the Realistic story condition, children chose the realistic picture 66% of the time, significantly more often than chance, $t(13)=2.53$, $p<0.05$. In the Fantastical story condition, children chose the realistic picture 82% of the time, also significantly more often than chance, $t(13)=8.97$, $p<0.01$. In the control condition, children chose the realistic picture 58% of the time, not significantly different from chance, $t(13)=1.66$, ns.

A one-way Analysis of Variance comparing scores across the three conditions found significant differences among responses, $F(2, 39)=5.67$, $p<0.01$,

$\eta^2=0.23$. Post-hoc comparisons (Bonferroni correction) revealed no difference in responses to the Realistic story and the Fantastical story, $t(26)=2.17$, ns. Comparisons of performance in the Control condition to the two story conditions showed that children in the Fantastical condition were significantly more likely to choose realistic pictures than children in the Control condition, $t(26)=3.91$, $p<0.01$, Cohen's $d=1.52$. There was no significant difference between choices in the Control condition and the Realistic condition, $t(26)=0.99$, ns.

Age group comparisons. A 2 (age group: Adult, Child) \times 2 (condition: Realistic, Fantastical) ANOVA on the proportion of participants' choices of the realistic pages revealed a significant main effect of age group, $F(1, 92)=4.88$, $p<0.05$, $\eta^2=0.025$, a significant main effect of condition, $F(1, 92)=52.71$, $p<0.01$, $\eta^2=0.27$, and a significant interaction, $F(1, 92)=45.77$, $p<0.01$, $\eta^2=0.23$. The main effect of age occurred because children were overall more likely to choose realistic pages than adults. The main effect of condition occurred because participants were overall more likely to choose realistic pages in the Realistic condition than in the Fantastical condition. The interaction effect reflects the fact that adults put more realistic pages into Realistic stories than into Fantastical stories, whereas children put realistic pages equally into both stories.

Finally, we conducted simple comparisons between the proportion of participants' choices of realistic pages in each condition. In the Realistic condition, adults were more likely to choose realistic pages than children, $t(45)=3.62$, $p<0.01$, Cohen's $d=1.08$. In the Fantastical condition, children were more likely to choose realistic pages than adults, $t(47)=5.83$, $p<0.01$, Cohen's $d=1.70$.

Discussion

When presented with the opportunity to extend fictional worlds, adults in this study chose realistic events to continue the Realistic story and fantastical events to continue the Fantastical story, as expected. Four-year-olds' choices, however, were skewed towards realistic events, regardless of whether they were continuing a realistic or fantastical story. This preference for realistic events when continuing stories was different from their baseline preferences, which were for an equal number of fantastical and realistic events. Indeed, they selected the realistic events more often when asked to continue a fantastical story than in this control condition, demonstrating that their choices in the Fantastical story condition reflect something other than mere preference.

Thus, like adults, 4-year-olds understand that realistic stories should only contain further realistic events, not fantastical ones (see also Weisberg and Sobel, 2012). But unlike adults, 4-year-olds do not recognise that fantastical fictional

worlds can license additional rule-breaking events. These results are inconsistent with the hypothesis that young children are fantasy-prone in their judgments about stories. Rather, they suggest that young children are reality-prone.

Why might this be the case? Although we believe that children's responses in this task reflect a genuine preference for realism in stories, a different possible explanation for children's reality-prone tendencies is that they simply had problems with the task. Extending a story requires children to abstract away the features of the individual events with which they were presented, create or access a category that contains those events (i.e., realistic or fantastical), and choose which of two novel events is also a member of that category. Children might have had difficulty with any of these steps, leading them to choose the realistic events because they did not understand how to find the appropriate match for each category of events.

Experiment 2 tests this possibility by presenting three groups of 4-year-olds with different prompts. One group of children (Story condition) was introduced to novel fantastical stories in the form of a set of pictures narrated by the experimenter. They were asked how best to continue the story, with a novel fantastical element or a novel ordinary element. This condition presents a replication of the Fantastical condition of Experiment 1, with a modification that allows children to see the full story context before making their choice about how to continue the story. In Experiment 1, children had to extend the story at various points, and it is possible that the first occurrence of a test question came at a point where children did not have enough information to judge whether the story was fantastical or realistic, thus they defaulted to choosing realistic events.

We also added a training element to the procedure. Before being asked about the fantastical stories, children were told stories about shapes that shared a particular property (e.g., they were all green) and were asked how to extend these stories: with a novel shape that had the same property (e.g., was green) or with a novel shape that had a different property (e.g., was yellow). Our goal with these training trials was to familiarise children with the idea of making judgments based on the similarity among the story elements. We predict that children will extend the training stories based on object properties like color, but that this training will be ineffective at encouraging children to extend fantastical stories with fantastical elements. Rather, we predict that children will extend fantastical stories with realistic pictures, as they did in Experiment 1.

The other two groups were given a similar task, but instead of being told that the pictures were part of a story, they were told either that the experimenter liked the content of the pictures (Desire Condition) or that all of the pictures depicted something that was *X*, where *X* was a novel word with derivational

morphology that clearly indicated an adjectival form, such as *blickish* (Word Condition). These comparison conditions were designed to test whether children have a general tendency to choose ordinary events over fantastical ones, or whether this tendency is particular to stories. We focused these investigations on figuring out an experimenter's preferences and learning new words because children understand others' desires at very early ages (e.g., Repacholi and Gopnik, 1997). Indeed, by the age of 3, they engage in categorization behaviors based on desire as a common element (e.g., Sobel and Munro, 2009; Fawcett and Markson, 2010). Similarly, teaching a novel word has been used extensively in the conceptual development literature to indicate the presence of a common category (e.g., Gelman and Markman, 1986; Landau et al., 1988). For these reasons, we predict that children in the Desire and Word conditions will be able to use the experimenter's expressed preferences or the presence of a novel word to create a coherent category of fantastical events – something they seem to resist doing when these events are presented as part of a story.

If the children in Experiment 1 had difficulty with our task because of the nature of our prompt, then children in Experiment 2 should demonstrate the same bias and choose mostly realistic pictures across all three conditions. But if their responses in Experiment 1 reflected children's intuitions about fictional stories *per se*, and not about fantastical events in other contexts, they should choose mostly realistic pictures only in the Story condition and demonstrate no trouble choosing fantastical pictures in the Desire and Word conditions.

Experiment 2

Methods

Participants. Sixty 4-year-olds (27 girls, $M=54$ months, $SD=4.7$ months, range 48–65 months) participated in this study. They were recruited from preschools and a children's museum in suburban areas of the East Coast and were tested in quiet rooms at their schools or at the museum. None of these children had participated in Experiment 1. There were twenty children in each of three conditions, Story, Desire, and Word, with approximately equal numbers of boys and girls in each condition.

An additional four children were tested but not included in the final sample because they failed both training questions (see below).

Materials. We created two new sets of ten pictures each, the Realistic set and the Fantastical set. Each picture depicted a character engaging in an action or

displaying an attribute. As with the test sets in the previous two studies, these two sets were created in pairs so that they would be roughly matched for content (see the Appendix for descriptions of the full stimulus set). There were two versions of each set, one depicting a male character and one depicting a female character. Children saw the pictures in which the character's gender matched their own.

We additionally created two training sets, which consisted of six pictures each. In the Green training set, there were five pictures of green shapes (circle, triangle, square, star and heart) and one yellow diamond. In the Triangles training set, there were five pictures of triangles in different colors (yellow, red, blue, brown and orange) and one purple square.

Procedure

Children were told that they would be playing a game with some pictures that the experimenter made. In the Story condition, which was meant to replicate the Fantastical condition of Experiment 1, the experimenter told the children that she would be picking out pictures to make some stories. In the Desire condition, the experimenter told the children that she would be picking out the pictures that she really liked. In the Word condition, the experimenter told the children that she would be teaching them a new word for some of the pictures. In this condition, we used three different nonsense words (tomic, daxy and blickish), randomising which word was used on which training trial and at test.

The procedure began with two training trials, counterbalancing whether each child saw the Green training set or the Triangle training set first. In these trials, the experimenter laid out the six cards from the set on the table and reminded the child of what she was doing with the pictures: making a story, showing the child which ones she really liked, or picking out all the ones that were daxy (or blickish or tomic), according to condition. The experimenter then picked out four pictures from the set, a randomised subset of the green shapes for the Green training set or a randomised subset of the triangles for the Triangle training set, and laid them out in a row on the table in view of the child. The experimenter described the contents of each picture chosen in a way that emphasised the child's condition. For example, for the Green set, the experimenter would say either "this green [shape] belongs in my story" or "I really like this green [shape]" or "this green [shape] is daxy."

After the experimenter finished choosing the four pictures, she drew the child's attention to the two remaining pictures, one of which matched the training set (another green shape or another triangle), and one of which did not (the yellow diamond or the purple square). She told the child that one of these pictures also belonged in the story, or was also one that she liked, or was

also daxy, and one of them was not. The two choice pictures were presented to the child, and the experimenter asked the child to tell her which of those two pictures was the one that goes in the story, or was the one that she liked, or was daxy. Children were provided with corrective feedback if they chose incorrectly. They then participated in the second training trial with the other training set and with a different nonsense word for children in the Word condition. Four children who gave incorrect (non-matching) responses to both training trials were excluded from the final analyses.

There were then two test trials, which used the pictures from the Realistic and Fantastical sets. As in the training, children saw six pictures laid out on the table: five from the Fantastical set and one from the Realistic set. The experimenter chose four of the Fantastical pictures according to a pre-determined random order. While she was choosing them, she used the same phrasing as in the training trials to remind children of their task: “See this picture, where the boy/girl goes outside by walking through the wall? This one goes in my story/is one that I really like/is blickish.” After four pictures were chosen and laid out in a row on the table, the experimenter presented the child with the two remaining pictures, another Fantastical picture and its Realistic analog. She described each picture and then asked the child to choose which picture also belonged in the story/she liked/was blickish. Children were given neutral feedback and asked to justify their choice. They then participated in a second test trial, which used the remaining five pictures from the Fantastical set and one Realistic picture.

For both the training and test trials, the left/right position of the matching choice was counterbalanced. We randomised which of the 10 pictures was used on each test trial, with the constraint that each of these pictures was used on the first test trial for at least one participant in each condition.

Results

Preliminary analyses found no effects of age or gender, so our main analyses do not consider these variables. Additionally, we found no differences in responding to the two test trials, so our main analyses are conducted on the total number of times each child chose the matching (fantastical) picture (see Table 1). Because there were fewer choices than in Experiment 1, we restricted our analyses to nonparametric tests.

A Kruskal–Wallis χ^2 -test found a statistically significant overall difference among the three conditions, Kruskal–Wallis $\chi^2(2, N=60)=7.25, p<0.05$. There was a significant difference in responding between the Story and Word conditions, whereby children chose the matching (fantastical) picture more often in the Word condition than in the Story condition, Mann–Whitney $U=109.00$,

Table 1
Number of children who chose the matching picture on 0, 1, or 2 trials in
Experiment 2, by condition

	Chose match 0 times	Chose match 1 time	Chose match 2 times
Story	11	6	3
Desire	6	7	7
Word	4	6	10

$z=-2.614, p<0.01$ (one-tailed). Additionally, children chose the matching picture more often in the Desire condition than in the Story condition, Mann–Whitney $U=139.50, z=-1.751, p=0.04$ (one-tailed). We found no significant difference in the number of times children chose the matching picture between the Desire and Word conditions, Mann–Whitney $U=166.00, z=-0.98, ns$.

We additionally compared the distribution of responses to chance. In the Story condition, this distribution was significantly different from chance, $\chi^2(2, N=20)=9.60, p<0.01$, with the majority of choices being the realistic pictures. The distribution of responses in the Word condition was also significantly different from chance, $\chi^2(2, N=20)=6.80, p<0.05$, with the majority of choices being fantastical. The distribution of responses to the Desire condition was not different from chance, $\chi^2(2, N=20)=1.90, ns$.

Discussion

The results of Experiment 1 suggested that children want to continue fantastical stories with realistic events. Experiment 2 was designed to probe whether these choices genuinely reflect children’s intuitions about stories or merely reflect some degree of confusion about the nature of the task. Our results point to the former interpretation. When this choice request was phrased in terms of a story, children demonstrated the same behaviour as in Experiment 1, generally preferring to continue the fantastical story with a realistic event. When this choice request was framed as asking children to figure out which picture an experimenter likes or which picture can take a new label, responses were different. In the Desire condition, they chose at chance between the fantastical and realistic options. This behaviour is interesting in light of their choices in the Control condition of Experiment 1. Children themselves prefer an equal mix of realistic and fantastical pictures, and may have assumed that the experimenter in Experiment 2 shares this preference.

More importantly, in the Word condition, children correctly chose the fantastical picture and not the realistic one as the recipient of the new word. This

demonstrates that 4-year-olds do have the ability to create an abstract category of fantastical events and can understand an adult's request to choose an additional event that conforms to this category. In turn, this suggests that children's choices in Experiment 1 and in the Story condition of Experiment 2 genuinely reflect their intuitions about stories in particular.

General Discussion

In two studies, we presented 4-year-olds with realistic and fantastical stories and asked what additional events belong in the stories: realistic events or fantastical events. In both studies, and unlike adults, children chose mostly realistic events to continue both types of stories, regardless of the established story content.

It is important to note that these results are not due to a global preference for realism or because children may have thought that a reality-based choice was the response that the adult experimenter wanted. Children chose fantastical events about half of the time in response to a request to pick which event they liked more (in Experiment 1), as well as in response to a request to choose which event an experimenter liked more (in Experiment 2). More strongly, when children were asked to group fantastical events together in the context of learning a new word, their preferences reversed, and they chose the fantastical picture more often. These results demonstrate that their consistently realistic responses to the stories were not due to a response bias and were unique to stories. That is, preferences for realistic events in stories indicate how children think about stories *per se*, and not about fantastical events in general.

These findings cast doubt on the common-sense notion that children believe that “anything goes” in a fictional context. Children may indeed be prone to magical thinking under certain circumstances (e.g., Harris et al., 1991; Subbotsky, 1992; Rosengren and Hickling, 2000). However, nearly all of the previous studies that found fantasy-prone behaviour involved pretend scenarios with fantastical content, whereas the current studies asked specifically about stories.

Why might children be reality-prone when it comes to stories? In considering this question, it is important to stress that this inclination towards realistic events is not incorrect. Even highly unrealistic fictional stories contain many realistic elements; the human characters on *Star Trek* all have ordinary biological functions, for example. One cannot necessarily infer, then, that stories containing many violations of real-world rules should contain additional violations. Children's tendency to continue fantastical stories with realistic events is thus not an error – ordinary events do occur in fantastical stories, both in those that we presented to the children and in those that children are exposed to at home.

What these results do demonstrate is that 4-year-olds are less fantasy-prone about stories than adults are, and indeed less fantasy-prone than many parents and researchers may have predicted.

We have explained this conservatism in terms of Bretherton's (1984) argument that young children can only access scripts of realistic events when conceptualising pretend play. This possibility fits with what philosophers have dubbed *the Principle of Minimal Departure*, which states that fictional worlds should include everything that is possible in the real world, unless the story explicitly forbids it (Ryan, 1980; see also Lewis, 1978; Walton, 1990). Although previous research has found that adults do not follow this principle strictly (Weisberg and Goodstein, 2009), it is possible that children do not yet have enough experience with fictional stories to reason in a nuanced way about what should and should not be included in a given fictional world. They may thus assume that all stories should look as much like reality as possible, unless they are explicitly told otherwise.

Another possible explanation for children's bias towards selecting realistic events in stories is that these responses simply reflect their understanding of how stories work. Many children's stories contain both fantastical and realistic entities and events, and even those stories that do not contain such events often involve cartoon drawings or talking animals in place of humans (e.g., *The Berenstain Bears*). Based on their experiences with the stories they hear, children may expect all fictional stories to have one or two impossible events in them, but not to be entirely fantastical (see also Boyer, 1994). One piece of support for this hypothesis is that, across our studies, children did occasionally choose to continue our stories, even the realistic ones, with events that violated real-world causal structure. Even adults responded in this manner at greater than floor levels.

An important question is when and how young children's responses changes to that of adults. We chose not to explicitly investigate this question in the current studies because we wanted to isolate how 4-year-olds, who are in the "high season of imaginative play" would continue fantastical stories. We believe that our discovery of preschoolers' reality-prone tendencies is interestingly counterintuitive. However, based on previous research, we can speculate that children's performance should begin to resemble that of adults' around age 6. This estimate is based on recent research on children's ability to recognise the difference between make-believe and hypothetical worlds (i.e., the difference between pretending and supposing). Studies suggest that this distinction is in place by age 6 (Amsel et al., 2005; see also Scarlett and Wolf, 1979). In addition, Bretherton (1984) argues that children come to appreciate higher-level fantasy scripts as their symbolic abilities mature, and that these scripts can be imposed and assimilated to their play. Future investigations should examine

and describe the process by which young children change their understanding of stories' content.

For the moment, though, we conclude that preschoolers are reality-prone about fictional stories. We found that the adults in Experiment 1 preferred realistic events as continuations for realistic stories and fantastical events as continuations for fantastical stories, matching their choices with the story's prior content, although they were more likely to perform this matching for realistic than for fantastical stories. However, the preschoolers in both of our studies tended to choose realistic events when extending or constructing stories, even when the stories they heard already contained many violations of real-world causal laws. While the preschool years might be the "high season of imaginative play," young children are not fantasy-prone in their understanding of fictional worlds.

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Appendix

Script of Stories and Choice Pictures Used in Experiment 1

Story Page 1

Realistic condition: My story is about a boy named Billy. Billy lived in a big, red-brick house with blue windows. Billy had a big playroom with lots of toys that he liked to play with. Billy's favorite toy was his scooter, but he wasn't allowed to ride on his scooter inside, he had to go outside when he wanted to ride. Sometimes, Billy would ride all the way down his block to see if any of his friends were playing outside too. But his mother always would tell Billy, "You can't go too far, or you might get in trouble." Billy's best friend was his dog Sparky. Sparky was a little yellow dog who liked running around and playing with Billy. Billy and Sparky liked going on adventures, and today was one of those days. Billy and Sparky decided to turn on the TV. When they turned on the TV, they saw that Blue's Clues was on. They watched Blue's Clues for a while, but then Billy got bored and decided he wanted to go get some ice cream. Billy left his house. He was already thinking about going to the ice cream store.

Fantastical condition: My story is about a boy named Billy. Billy lived in a big house that looked just like a baseball. Billy could fly, and he would fly all around the house and play with his favorite toys. His favorite toy was his invis-maker. When Billy touched his invis-maker, he would become invisible, and he could fly all over the house and nobody would see him. Sometimes, he would scare his

mother while he was invisible, and she didn't like that, but then Billy would fly away so he couldn't get in trouble. Billy's best friend was his dog Sparky. Sparky was a little yellow dog who could talk, so Billy liked talking to Sparky when he was lonely. Billy and Sparky liked going on adventures, and today was one of those days. Billy and Sparky decided to turn on the TV. When they turned on the TV, they saw that Blue's Clues was on. They watched Blue's Clues for a while, but then Billy got bored and decided he wanted to go get some ice cream. Billy left his house. He was already thinking about going to the ice cream store.

First Choice

Realistic choice picture: Billy wanted to get to the ice cream store quickly. He walked through his town, saying hello to his friends on the way. Sparky walked next to him. Sparky sometimes ran ahead to chase a squirrel, but he always came back. Billy's legs were getting tired, but finally he was at the ice cream store.

Fantastical choice picture: Billy wanted to get to the ice cream store quickly. He held onto Sparky and closed his eyes really tightly and spun in a circle. Then, all of a sudden, he disappeared with a "poof." Billy was gone from his house, but a second later, he reappeared with another "poof" at the ice cream store.

Story Page 2

Realistic condition: Billy went inside the store. Sparky tried to come inside the store too, but Billy said, "No Sparky, you have to stay outside." Inside, Billy saw that there were a lot of flavors. Billy saw his friend Johnny in line. Johnny was practicing doing cartwheels. Right in the line, he ran forward then he jumped and did a full cartwheel. He still landed on his feet. "Wow Johnny, I didn't know you could do that!" said Billy. "Yep, I'm teaching myself to do really good cartwheels," said Johnny, and he got his ice cream and walked out the door to leave the store. Soon, it was Billy's turn, so he told the man what he wanted and paid his money.

Fantastical condition: Billy went inside the store. Sparky said to Billy, "Can I come inside?" but Billy said, "No Sparky, you have to stay outside." Inside, Billy saw that there were a lot of flavors. Billy saw his friend Johnny in line. Johnny reached out to give Billy a high five, and his hand went straight through the bodies of the other people between him and Billy. "Wow Johnny, I didn't know you could do that!" said Billy. "Yep, I'm teaching myself how to go through things," said Johnny, and he got his ice cream and walked straight through the wall to leave the store. Soon, it was Billy's turn, so he told the man what he wanted and paid his money.

Second Choice

Realistic choice picture: The ice cream that the man gave Billy was chocolate with little chocolate chips in it, on top of a yellow cone. The cone was crunchy, but Billy really liked the ice cream.

Fantastical choice picture: The ice cream that the man gave Billy back was very hot and bubbling up over the cone, like lava. It was a little too hot to eat, but he really liked it.

Story Page 3

Realistic condition: Billy walked outside, where Sparky was waiting. “I know, Sparky, we’ll go to a petting zoo,” said Billy. When Billy got to the petting zoo, Sparky ran ahead to go play with the animals. Sparky chased after a goat, but before he could run through the fence, the zookeeper stopped him. The zookeeper said to Billy, “Your dog can’t come in, he will scare all of the animals.” “Sorry Sparky,” said Billy, “but you’re going to have to stay outside.”

Fantastical condition: Billy walked outside, where Sparky was waiting. “I know, Sparky, we’ll go to a petting zoo,” said Billy. When Billy got to the petting zoo, Sparky decided he wanted to scare the animals, so he flew into the air high above the ground and began to bark at the other animals. The zookeeper got angry and he said to Billy, “Your dog is not allowed to fly here.” “Sorry Sparky,” said Billy, “but you’re going to have to stay outside.”

Third Choice

Realistic choice picture: Billy looked inside the petting zoo to see the sheep. The sheep were white and fluffy, and they walked on four legs. “Baaaaah,” said the sheep. “Oh, I’ve seen sheep like this before,” said Billy. He went inside to see what other animals were in the petting zoo.

Fantastical choice picture: Billy looked inside the petting zoo to see the sheep. The sheep were walking around, and they were walking on seven legs. “Hello!” said the sheep. “Oh, I’ve seen sheep like this before,” said Billy. He went inside to see what other animals were in the petting zoo.

Story Page 4

Realistic condition: At the petting zoo, Billy got to play with a lot of different animals. He got to feed a goat, pet a sheep, and ride a pony. The wool of the sheep was soft and warm when Billy rubbed his hand through it, but the pony’s hair was itchy. Billy had fun at the petting zoo, but soon, he could hear Sparky barking from outside. “You must want to leave, Sparky,” said Billy, and he left the petting zoo. Sparky was really happy to see Billy when he came outside.

Fantastical condition: At the petting zoo, Billy got to play with a lot of different animals. He got to feed a zorknod, pet a three-eyed fangleknot, and ride a tubaroo. The scales of the fangleknot felt like a fish, and Billy didn't like that feel. He did have fun riding the tubaroo, especially when he got to hold onto both of its long ears. Billy wanted to stay longer, but Sparky called from outside, "Billy, I'm ready to go, I don't like some of these animals," so Billy decided to leave.

Fourth Choice

Realistic choice picture: Next, Billy wanted to get to the creek. To get there, he had to cross the road. When Billy got to the road, he saw that it was black with yellow stripes.

Fantastical choice picture: Next, Billy wanted to get to the creek. To get there, he had to cross the road. When Billy got to the road, he saw that it was blinking all different colors.

Story Page 5

Realistic condition: Billy went to the creek to see what other animals he could find. When he got there, he saw a frog, and the frog was hopping by. The frog was moving slowly, so Billy caught the frog in his hands. "Ribbit, ribbit," said the frog, and then it stuck its tongue out and caught a bug. "That's funny," said Billy, "I caught a frog, and the frog caught a bug." Then Billy let the frog go so it could go back into the creek.

Fantastical condition: Billy went to the creek to see what other animals he could find. When he got there, he saw a frog, and the frog was hopping by. The frog moved fast, but Billy had super-speed, so he could run across the water and he caught the frog. "Put me down!" said the frog, and then it stuck its tongue out at Billy. "Sorry, Mr. Frog," said Billy, and he let the frog go. The frog looked back, then hopped away and splashed into the creek.

Fifth Choice

Realistic choice picture: Billy picked up a rock and let it go so it would make a splash in the creek. The rock made a huge splash, and Billy laughed. He tried it two more times with different rocks. The bigger the rock he used, the bigger the splash it made. Soon, Billy ran out of rocks to throw, but he had had fun.

Fantastical choice picture: Billy picked up a rock and let it go so it would make a splash in the creek. But the rock didn't fall down when Billy dropped it. Instead, the rock flew out of Billy's hand and danced up and down in front of Billy. Then the rock suddenly zoomed to the left, flew up, and then disappeared into the forest.

Story Page 6

Realistic condition: Billy was very tired from his long day, and he was hungry too. He and Sparky walked back to their home, and his mother was waiting for him. “Billy, you have been gone for the whole day,” she said. Billy went upstairs to wash his hands, and while he was up there, his mother made him dinner. She made the food by putting it in the oven, which made it very hot. Then she put the food on the table so Billy could eat it. Billy sat down and was ready for his dinner.

Fantastical condition: Billy was very tired from his long day, and he was hungry too. He and Sparky flew back to their home, and his mother was waiting for him. “Billy, you have been gone for the whole day,” she said. Billy went upstairs to wash his hands, and while he was up there, his mother made him dinner. She made dinner by touching the food with her finger, which made it very hot, and then she used her finger to float the food towards the table for Billy to eat. Billy was ready for his dinner.

Sixth Choice

Realistic choice picture: Billy’s mother had cooked him spaghetti for dinner. Billy picked up his spoon and took big spoonfuls of spaghetti to eat for his dinner. Then his mother brought out his dessert. It was a big bowl of pudding.

Fantastical choice picture: Billy’s mother had cooked him dirt for dinner. Billy picked up his spoon and took big spoonfuls of dirt to eat for his dinner. Then his mother brought out his dessert. It was a big bowl of ants.

Story Page 7

Realistic condition: After dinner, Billy asked his mother if he could play outside. His mother said “OK,” so Billy walked out the door to go play.

Fantastical condition: After dinner, Billy asked his mother if he could play outside. His mother said “OK,” so Billy walked through the wall to go play.

Seventh Choice

Realistic choice picture: While Billy was running around outside, he fell and banged his leg. It hurt, so Billy went inside and showed his mother. She got him a bandage and put it on his leg. Pretty soon, it didn’t hurt as much.

Fantastical choice picture: While Billy was running around outside, he fell and banged his leg. It hurt, so Billy touched it with his finger. Right away, his leg started healing itself where Billy had touched it. Pretty soon, it didn’t hurt at all.

Story Page 8

Realistic condition: Billy was tired after his long day. He wanted to get right into bed, but he knew he was supposed to brush his teeth first. Billy went upstairs,

got out his toothbrush, and put some of his new toothpaste on it. Then, he scrubbed back and forth at his teeth, even the ones in the back, until they were all clean. Billy washed his hands and his face, and then left the bathroom to get into bed.

Fantastical condition: Billy was tired after his long day. He wanted to get right into bed, but he knew he was supposed to brush his teeth first. Billy went upstairs and put his magical tooth cleaning dust on his teeth. He waved his hand in front of his mouth, and then in a second, all of his teeth were clean and perfectly white. Billy washed his hands and his face, and then left the bathroom to get into bed.

Eighth Choice

Realistic choice picture: Inside his room, Billy saw the new bed that his parents had bought for him. The bed was shaped like a rectangle and there were baseballs on the covers. “Man,” said Billy, “this new bed looks just like my old one.” Billy tucked himself into his bed so he wouldn’t get cold at night and started to fall asleep.

Fantastical choice picture: Inside his room, Billy saw the new bed that his parents had bought him. The bed was standing up against the wall, and Billy realized that he would have to stand up in order to sleep. “Man,” said Billy, “this new bed looks just like my old one.” Billy strapped himself into his bed so he wouldn’t fall over.

Story Page 9

When Billy’s mother came up to check on him ten minutes later, he was fast asleep. He was so tired because he had had such a long day.

Description of Pictures Used in Experiment 2

Set 1

Realistic: The boy eats his soup with a spoon.

Fantastical: The boy eats his soup by looking at it.

Set 2

Realistic: Whenever the boy is happy, he smiles.

Fantastical: Whenever the boy is happy, he turns purple.

Set 3

Realistic: The boy walks to school.

Fantastical: The boy flies to school.

Set 4

Realistic: The boy has a pet cat.

Fantastical: The boy has a pet dragon.

Set 5

Realistic: The boy goes outside by walking through the door.

Fantastical: The boy goes outside by walking through the wall.

Set 6

Realistic: The boy eats ice cream for dessert.

Fantastical: The boy eats lightning for dessert.

Set 7

Realistic: The boy sleeps tucked into in his bed.

Fantastical: The boy sleeps floating in the air.

Set 8

Realistic: The boy has a dog that can roll over.

Fantastical: The boy has a dog that can talk.

Set 9

Realistic: The boy opens his closet and finds a stuffed, toy monkey.

Fantastical: The boy opens his closet and finds a monkey with wings.

Set 10

Realistic: The boy plays with blocks.

Fantastical: The boy plays with a rainbow.

Note: Male subjects heard this text, about a boy main character, and female subjects heard about a girl main character. In both cases, the pictures showed a character that matched the subject's gender.